
mitsubishi electric

ENERGY MONITORING

AE-C400E/EW-C50E

APPLICATION GUIDE

Version 1.00

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1. Introduction

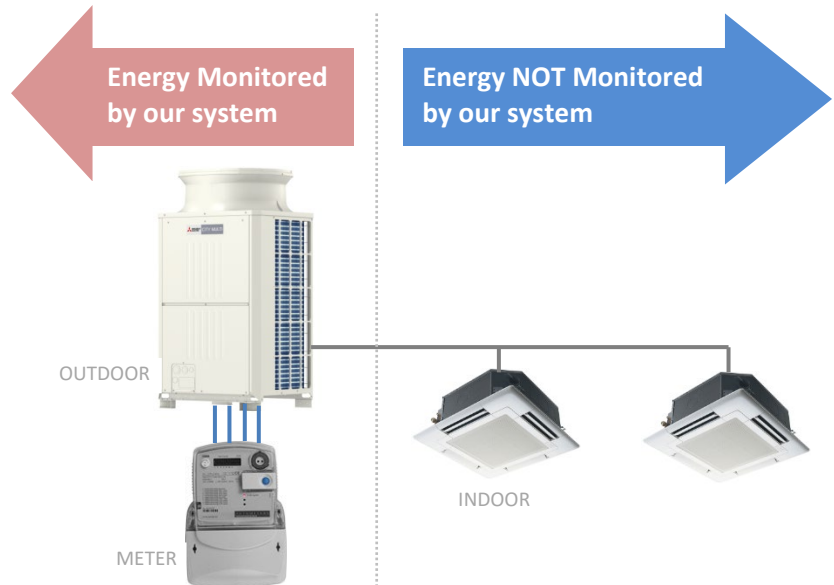
Energy monitoring is becoming more important as you cannot manage if you don't measure.

This document explains the different options available with our centralised controllers and our software package.

2. Important terms

It is important to understand the different terms in energy monitoring.

In all the options described in this guide, the indoor unit energy monitoring data is not taken into account as the indoor unit power supply is always connected locally.

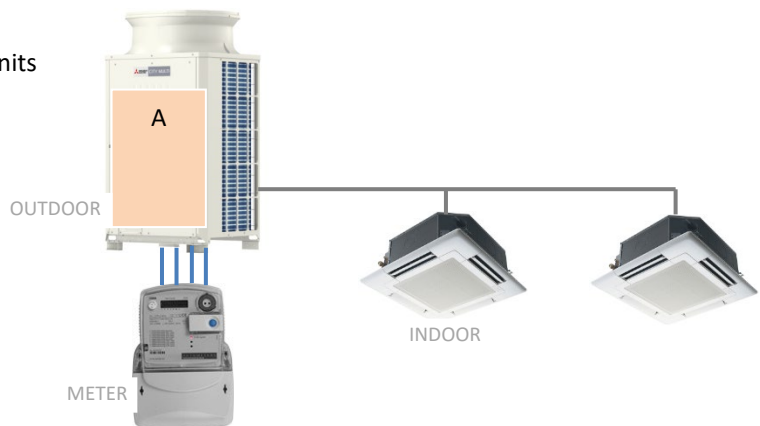


2.1. kW per system

kW per system means that the energy output will be the energy consumption of the outdoor unit.

A = Outdoor energy consumption for all indoor units

⇒ Output = A kW



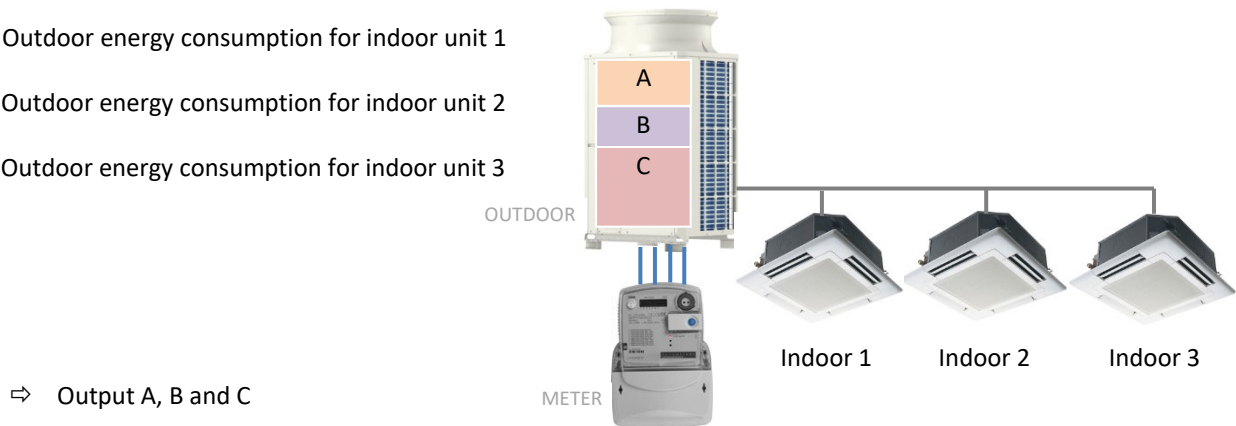
2.2. kW per indoor

kW per indoor means that the outdoor unit energy consumption will be apportioned using the indoor unit information.

A = Outdoor energy consumption for indoor unit 1

B = Outdoor energy consumption for indoor unit 2

C = Outdoor energy consumption for indoor unit 3



For instance:

Unit 1 has been using 25% of the outdoor.

Unit 2 has been using 25% of the outdoor.

Unit 3 has been using 50% of the outdoor.

If the energy meter has registered 10kW then:

- Unit 1 will have used 2.5kW of the outdoor unit energy consumption
- Unit 2 will have used 2.5kW of the outdoor unit energy consumption
- Unit 3 will have used 5kW of the outdoor unit energy consumption

3. Quick features overview

Below is a table describing the features for each product.

Products	Meter connection	kW per system	kW per areas	kW per indoor	kW for 3rd party	Cost using tariffs	Output
AE-C400E	Pulse via PAC-YG60MCA	✓	✓	✓	✓	✗	Graphic and CSV
AE-200E	Pulse via PAC-YG60MCA	✓	✓	✓	✓	✗	Graphic and CSV
MelcoBEMS	Pulse via PAC-YG60MCA	✓	✓ via AE-C400E/ EW-C50E	✓ via AE-C400E / EW-C50E	✗	✗	BACnet or Modbus

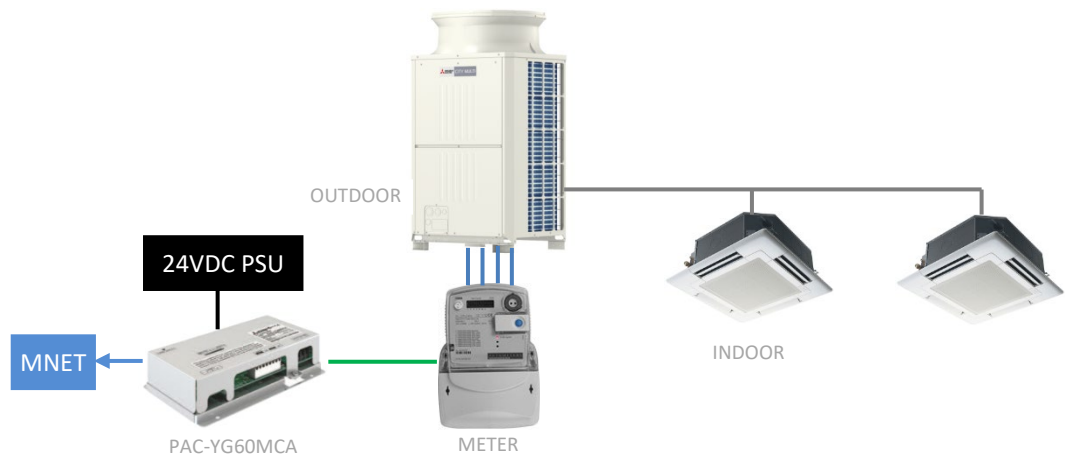
4. Connecting the energy meter and setting up

To accurately monitor and calculate the energy consumption, energy meters are required. We do not supply energy meters directly to our customers but most of the pulse energy meters are compatible with our MNET pulse meter interface: the PAC-YG60MCA.

The PAC-YG60MCA has 4 channels and can therefore monitor up to 4 pulse energy meters.

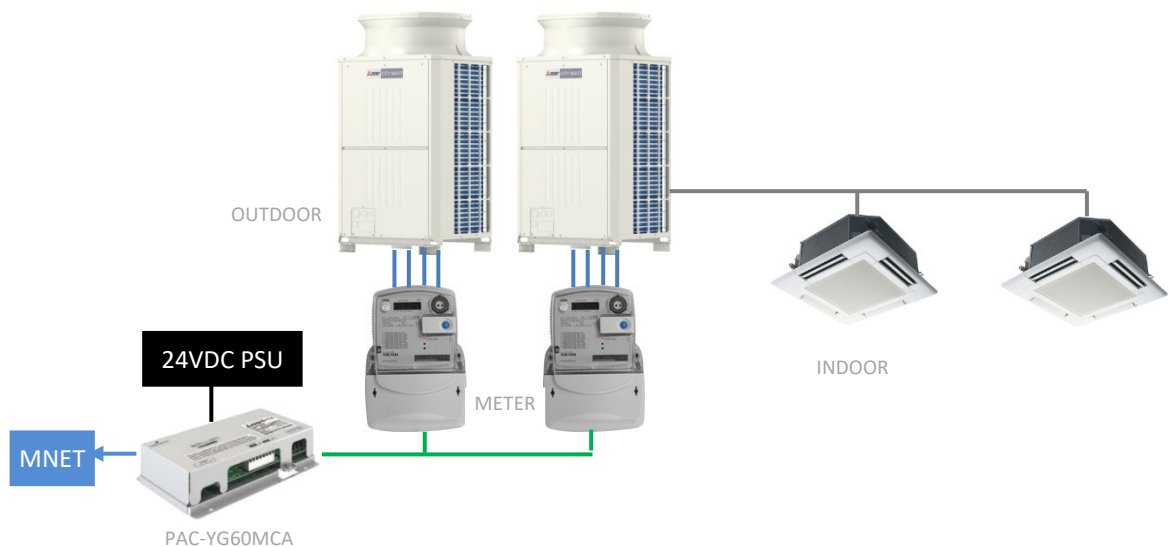
4.1. Using single module

When using a single module, one energy meter is connected to each outdoor unit.



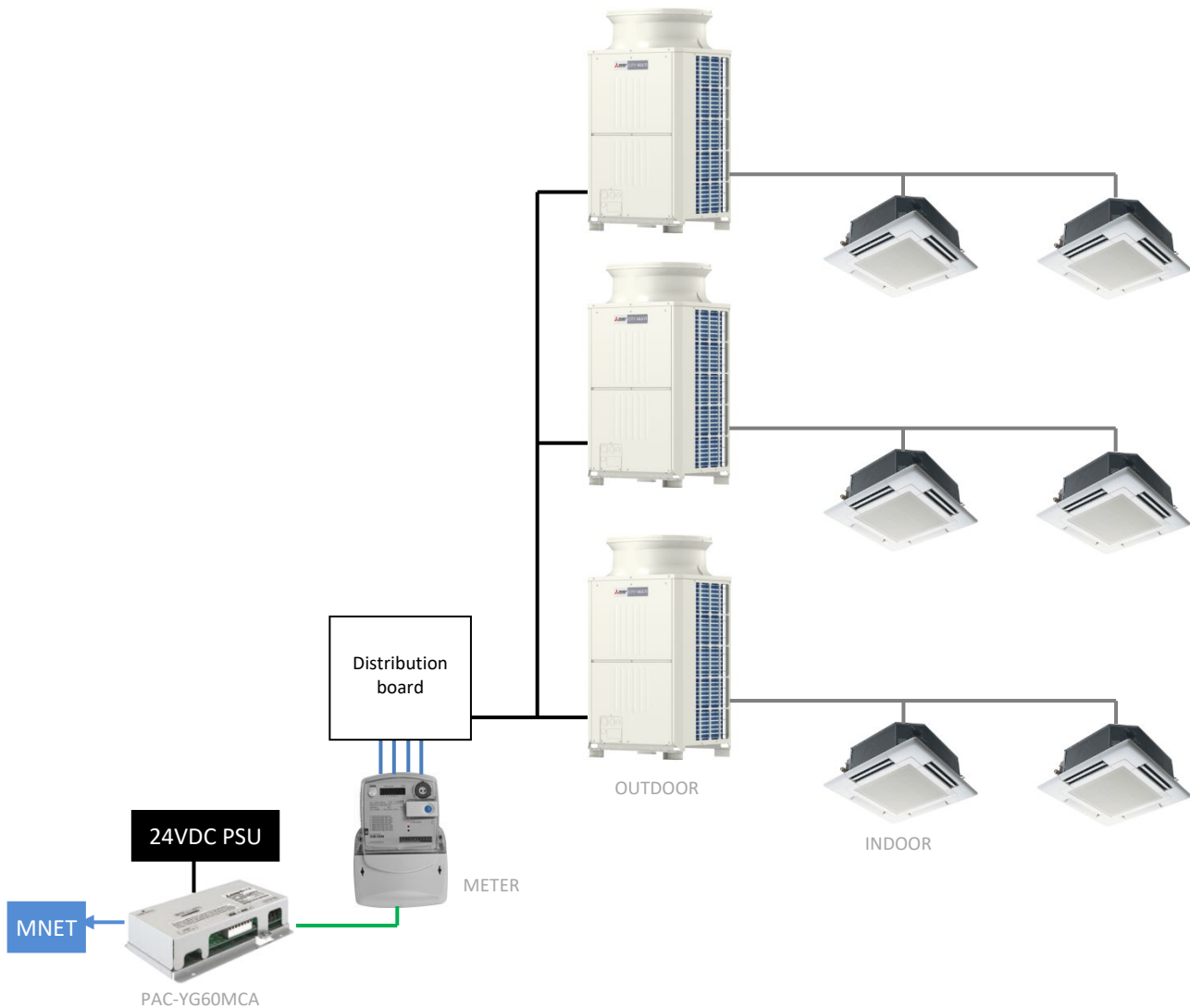
4.2. Using multiple modules

When using multiple modules, one energy meter is connected to each module but all the energy meters will be connected together to one channel only.



4.3. Using one meter for multiple systems

To reduce the cost of the energy monitoring package, it is possible to use one energy meter for multiple systems.



4.4. Using City Multi and Splits systems

We strongly recommend separating the power supply between splits and City Multi systems.

At least two pulse energy meters will then be required, one for City Multi and one for Splits systems which means two PAC-YG60MCA channels.

4.5. Connecting EM540 3-phase energy meter EM540DINAV23XO1X or EM511 1-phase EM511DINAV81XO1X to the PAC-YG60MCA

Meter:

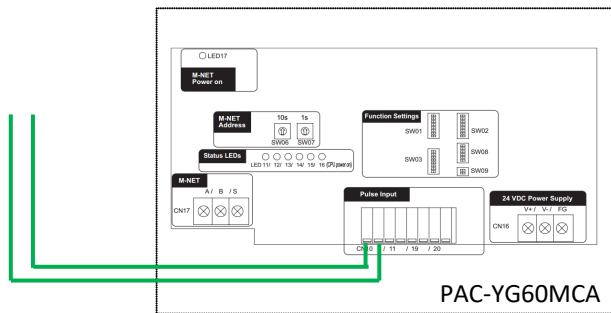


EM540DINAV23XO1X RS Stock No:263-2904



EM511DINAV81XO1X RS Stock No:430-078

Wiring diagram:



4.6. Setting up the meters and the PAC-YG60MCA

Setup the PAC-YG60MCA and the energy meters using the initial settings tool.
(please scan QR code to see video on [how to install the Initial Settings tool](#))



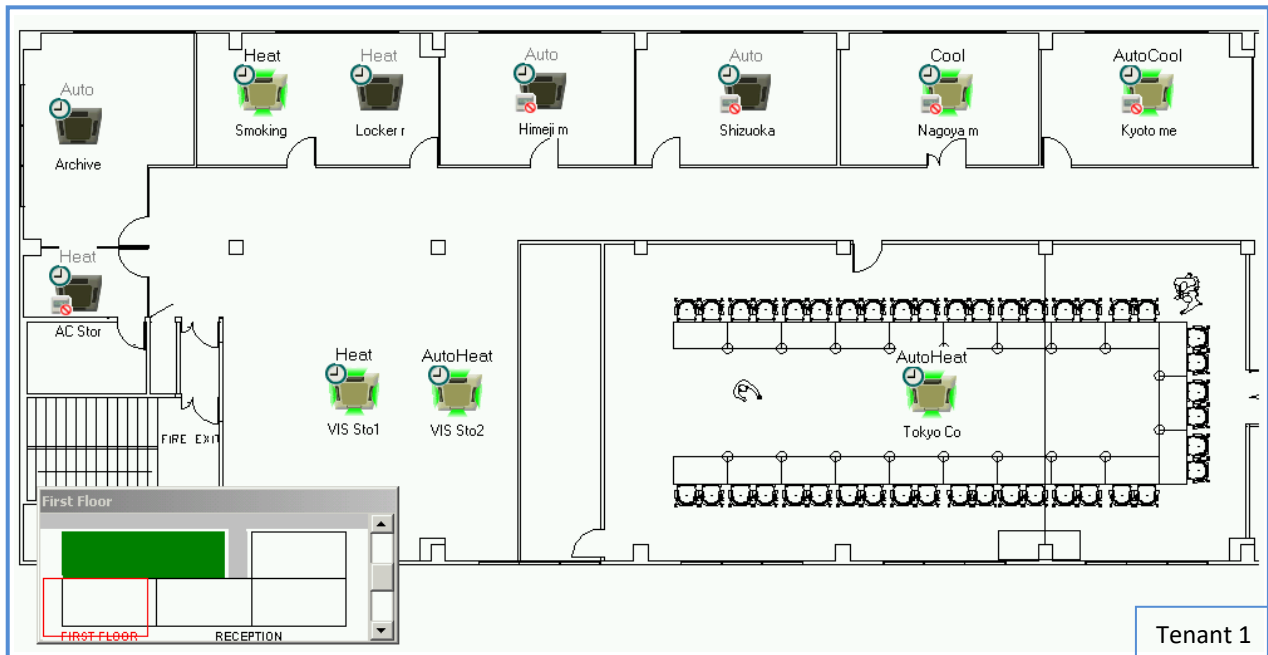
See section 16-2-8 of the AE-C400E/EW-C50E Instruction book for instruction on how to setup the PI Controller (PAC-YG60MCA).

5. Energy monitoring per system and with or without 3rd party equipment

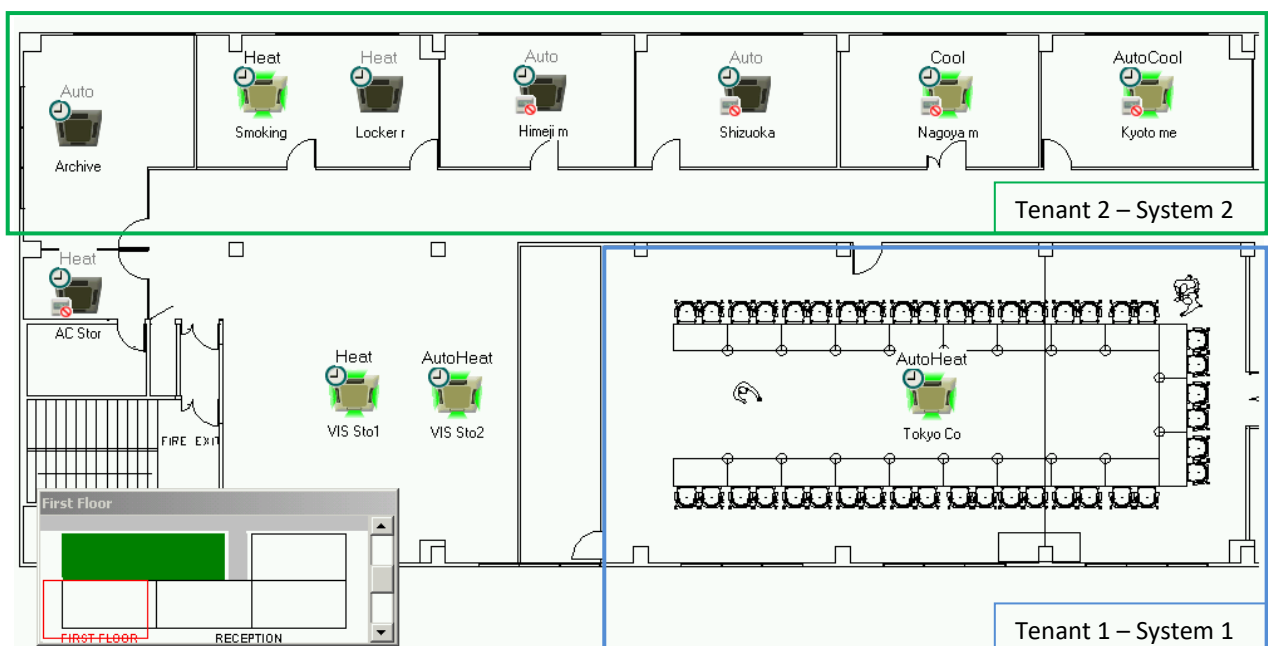
5.1. Overview and application

This solution allows the energy meter values to be shown on the AE-C400E display but also and the AE-C400 or EW-C50 Webpages.

This option is ideal when there is only one tenant in the building.

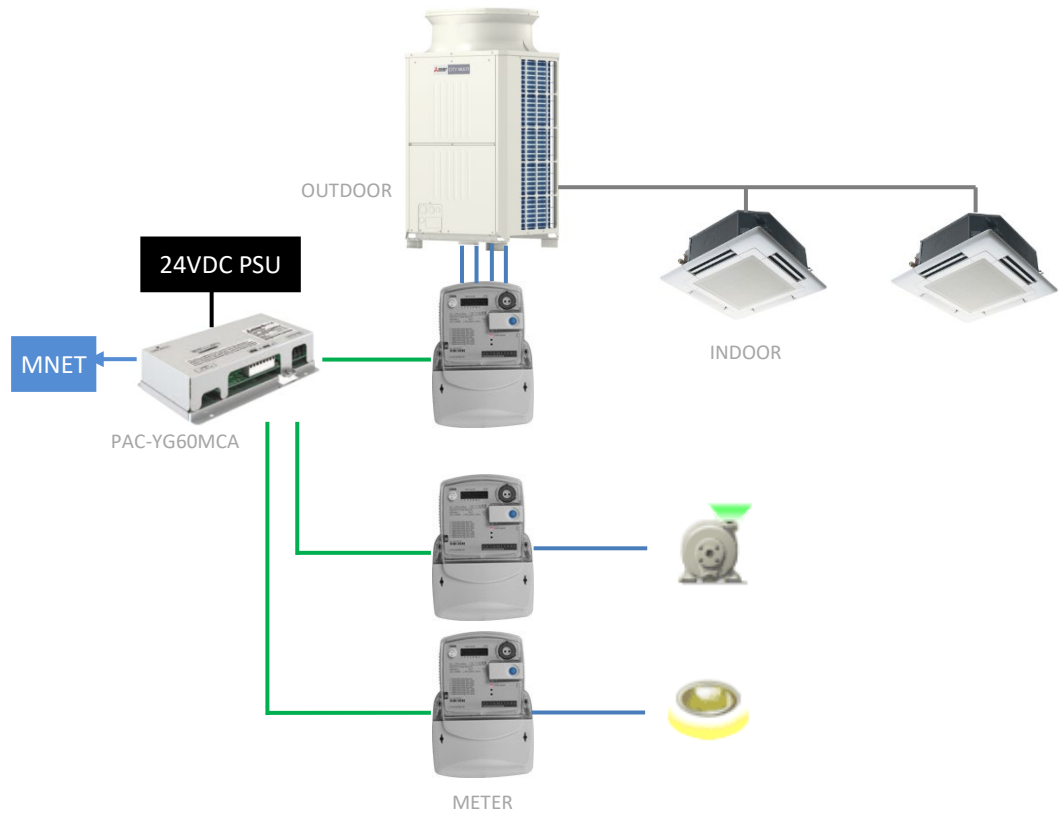


This option can also be used when you have multiple tenants but each tenant will need to have its own systems. The tenant energy consumption will then be the system energy consumption.



5.2. Setup

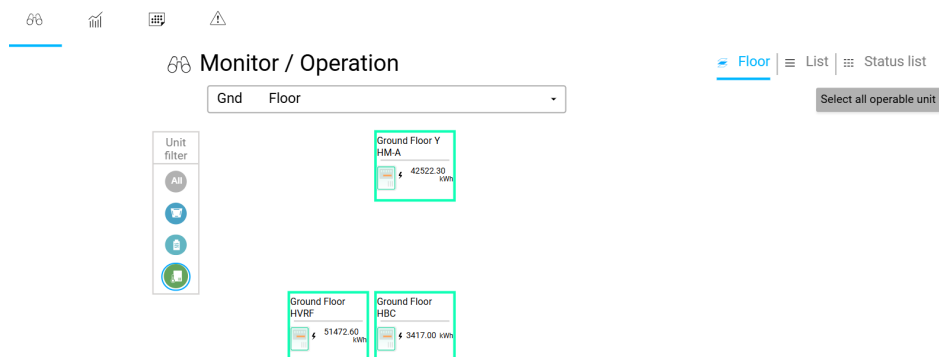
Up to 4 pulse energy meters can be monitored by the PAC-YG60MCA so up to 4 3rd party equipment may be monitored. It is also possible to monitor outdoor energy consumption by connecting a meter to the outdoor unit as shown below.



5.3. Output details

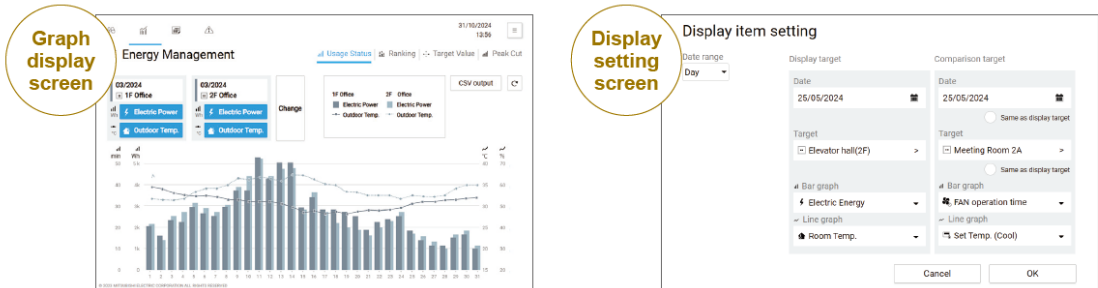
5.3.1. AE-C400E Display

The pulse energy meters values will be displayed on the AE-C400 screen and on the AE-C400E/EW-C50E web pages.



5.1. Trend data

Trend data is displayed on the Screen (AE-C400E) and Webpages. Data can be downloaded via CSV files. AE-C400 is provided with an energy management function as standard. With this function, you can understand the current status of usage of air conditioners and verify the effect of energy saving measures.



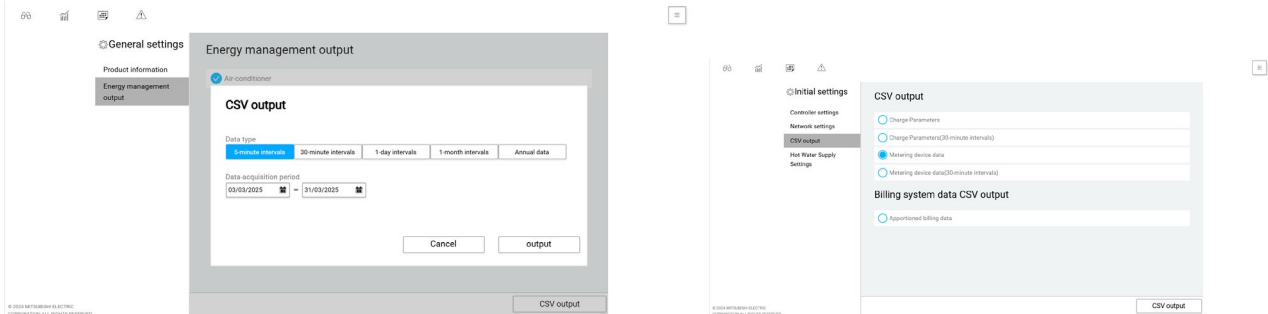
Contents of display

Example of bar graph items	• Target electric energy • Power consumption*1 • Fan operation time	• Thermo ON time (cooling/heating/total) • Calculated values*1 (electric energy, etc.)
Example of line graph items	• Indoor temperature • Set cooling temperature	• Set heating temperature • Measured values*2 (outdoor temperature, humidity, etc.)

*1. It is necessary to input the amount of electric energy to AE-C400 through PI controller or Modbus watt-hour meter.
*2. Analog signals must be input from the AI controller.

5.2. Exporting data

The energy monitoring information (kWh) can be exported to a CSV file (Excel format) using the Download button on the General Settings page or Initial Settings page.



File Home Insert Page Layout Formulas Data Review View Automate Help Acrobat SAP Analytics Cloud							
Clipboard Font Alignment Number Styles Cells							
R1							
	A	B	C	D	E	F	G
1	622						
2	11/05/2025 14:00-15/05/2025 13:30						
3	MCP 50-1						
4	No.	Date	Time	Count value(Ch1)	Count value(Ch2)	Count value(Ch3)	Count value(Ch4)
5	501	11/05/2025	14:00	42427.5	51346.2	3407.4	
6	501	11/05/2025	14:30	42427.5	51346.3	3407.4	
7	501	11/05/2025	15:00	42427.7	51346.3	3407.4	
8	501	11/05/2025	15:30	42427.7	51346.3	3407.4	
9	501	11/05/2025	16:00	42427.7	51346.3	3407.4	
10	501	11/05/2025	16:30	42427.8	51346.4	3407.4	
11	501	11/05/2025	17:00	42427.9	51346.4	3407.4	
12	501	11/05/2025	17:30	42427.9	51346.4	3407.4	
13	501	11/05/2025	18:00	42428	51346.4	3407.4	
14	501	11/05/2025	18:30	42428.1	51346.5	3407.4	
15	501	11/05/2025	19:00	42428.1	51346.5	3407.4	
16	501	11/05/2025	19:30	42428.1	51346.5	3407.4	
17	501	11/05/2025	20:00	42428.2	51346.5	3407.4	

5.3. Compatibility

The table below shows compatibility with different product ranges.

Product range	Compatible
M Series	✓
P Series Mr Slim	✓
City Multi	✓
Lossnay	✓

5.4. Options required

Products	Details	Supplied by MEUK
Centralised controller	AE-C400E or EW-C50E	✓
Power supply	PAC-SC51KUA	✓
Power supply	24VDC power supply	✗ (Refer to section 8)
PIN Code	None required*	N/A*
Interface	PAC-YG60MCA	✓

*PIN code purchase required for Energy Apportioning via MEUK.

6. Energy monitoring per indoor unit or area

6.1. Overview and application

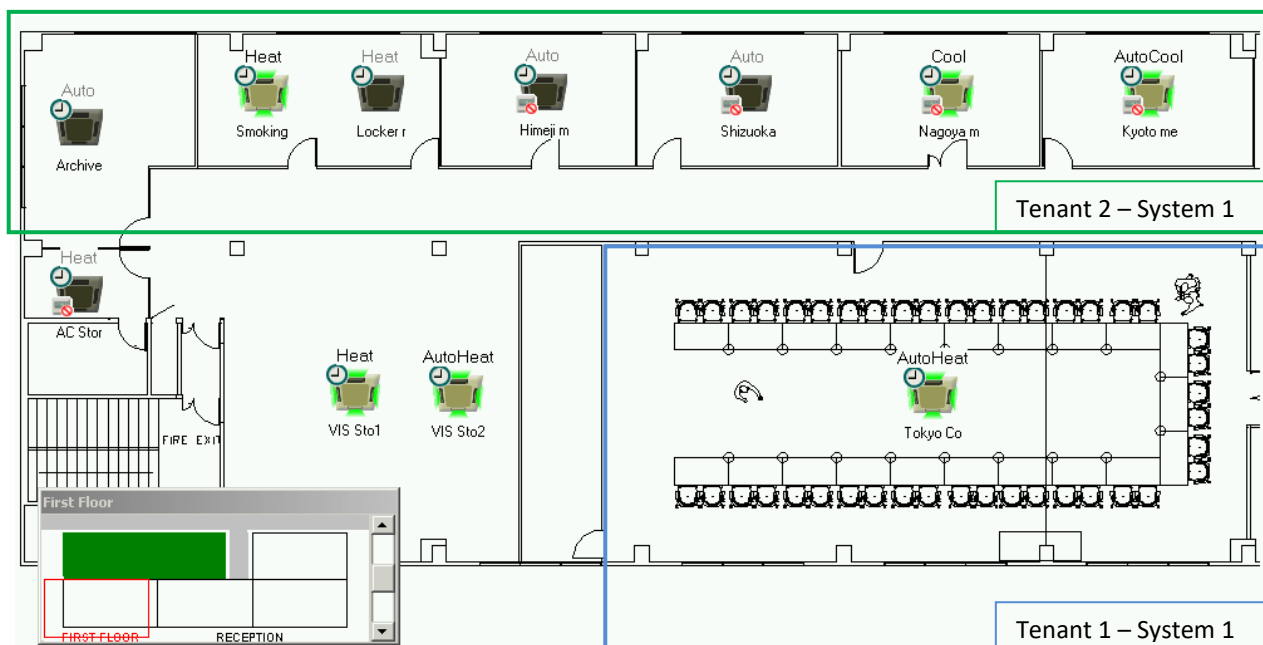
This solution allows the outdoor energy consumption in kW to be distributed across all indoor units. This information is shown on the AE-C400E screen or / and AE-C400E / EW-C50E Webpages software.

The AE-C400E and EW-C50E read the outdoor energy consumption from the pulse power meters and distribute it across the indoor units using indoor unit factors. Indoor unit factors are dependent of the running time of the unit, the size of the unit and the load of the unit.

The formula is per below:

$$IndoorUnitA = TotalEnergy \times \frac{IndoorUnitAFactor}{\sum IndoorUnitFactor}$$

This option is used when you have multiple tenants sharing the same system.

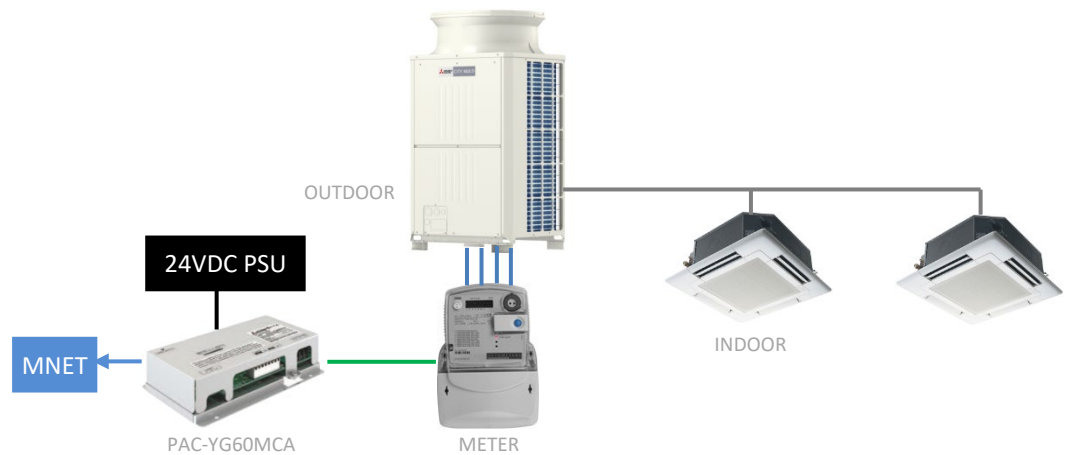


6.2. Data storage

The AE-C400E or EW-C50E is storing the data onto internal memory SD cards. The energy management data for the past 24 months (daily or monthly data) or the past 5 years (annual data) from the present can be retained.

6.3. Setup

The setup is quite simple. All you need is one energy meter to monitor the outdoor energy consumption.



7. Energy monitoring with BEMS

7.1. Export energy monitoring data to a BEMS system

Export energy monitoring data to a BEMS system:

- Option: using our MelcoBEMS interface. The BEMS will then be able to view energy monitoring data through Modbus or BACnet protocol

7.2. Energy monitoring with BEMS using the AE-C400E/EW-C50E

7.2.1. Overview

The apportioned amount of power consumption kWh (not monetary values) can be read through BACnet (BACnet and Energy Apportioning PIN codes require to be purchased from MEUK).

7.2.2. Compatibility

The table below shows compatibility with different product ranges.

Product range	Compatible
M Series	✓
P Series Mr Slim	✓
City Multi	✓
Lossnay	✓

7.2.3. Options required

Products	Details	Supplied by MEUK
Centralised controller	AE-C400 or EW-C50	✓
Power supply	PAC-SC51KUA	✓
Power supply	24VDC power supply	✗ (Refer to section 8)
PIN Code	Energy Apportioning and BACnet	✓
Interface	PAC-YG60MCA	✓

7.3. Energy monitoring with BEMS using the MelcoBEMS interface

7.3.1. Overview

When the MelcoBEMS is connected to the AE-C400 or EW-C50, the energy monitoring data can be seen on the Modbus or BACnet BEMS network.

It is important to ensure the AE-C400-Energy or EW-C50-Energy PIN code is active to allow energy monitoring. At least one PAC-YG60MCA must be connected to the AE-C400 / EW-C50 to allow the AE-C400 / EW-C50 to monitor pulses from the field supplied energy meter.

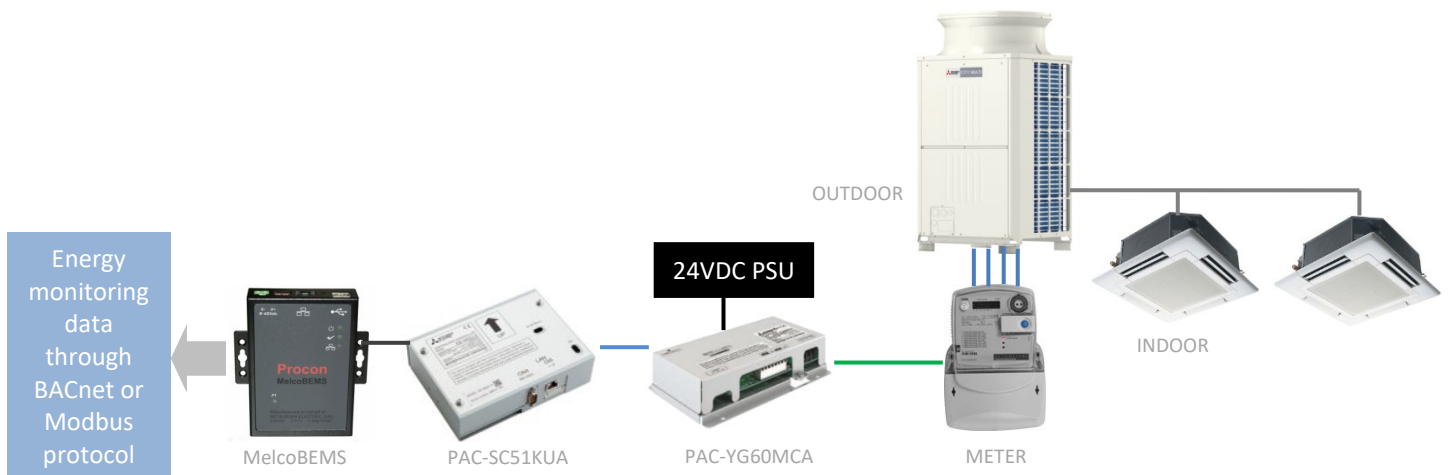
The BEMS will be able to monitor two different points:

- Previous Day Energy (kWh)
- Previous Month Energy (kWh)

The MelcoBEMS does not log the energy data. It is down to BEMS to monitor and log the data every day or every month.

7.3.2. Setup

It is important to connect the pulse energy meter to the PAC-YG60MCA and not the BEMS. The MelcoBEMS will then read the information from the AE-C400 / EW-C50.



7.3.3. Output details

The energy monitoring data is calculated by the central controller and is available on BACnet or Modbus.

The MelcoBEMS requests daily data every day at 00:05 and monthly data at 00:15 on the last day of the month. Monthly and daily data are also requested on power up.

For more information about air conditioning energy monitoring, refer to the central controller manuals.

7.3.4. Compatibility

The table below shows compatibility with different product ranges.

Product range	Compatible
M Series	✗
P Series Mr Slim	✗
City Multi	✓
Lossnay	✗

7.3.5. Options required

Products	Details	Supplied by MEUK
Centralised controller	AE-C400 or EW-C50	✓
Power supply	PAC-SC51KUA	✓
Power supply	24VDC power supply	✗ (Refer to section 8)
PIN Code	AE-C400 / EW-C50- Energy (pre-installed) *	✓*
Interface	MelcoBEMS	✓
Interface	PAC-YG60MCA	✓

*Energy Apportioning PIN code requires to be purchased from MEUK.

8. Third Party Equipment Suggestions

8.1. Energy meters

MODBUS energy meters for **energy monitoring only**. Direct connection to AE-C400E/EW-C50E.
(MODBUS energy meters cannot be used for Energy Apportioning)

Suggestion 1:

Detail: EM340 Three-phase MODBUS Energy Meter EM340DINAV23XS1X
Supplier: uk.rs-online.com (RS Stock Number: 223-8058)



Suggestion 2:

Detail: EM112 Single-phase MODBUS Energy Meter EM112DINAV01XS1X
Supplier: uk.rs-online.com (RS Stock Number: 223-8044)



8.2. 24VDC power supplies

Suggestion 1:

Detail: XP POWER - DNR05US24 - DIN RAIL PSU, 5W, 24V SINGLE O/P (DNR05US24)
Supplier: uk.farnell.com (Farnell order code: 1858048)



Suggestion 2:

Detail: IMO PRECISION CONTROLS - DPS-1-018-24 - PSU, 18W, 24DC, 0.75A, DIN MOUNT (DPS-1-018-24)
Supplier: uk.farnell.com (Farnell order code: 1714519)



9. Information about Ofgem and MID

9.1. Introduction

Ofgem regulates the electricity and gas markets in the UK.

MID, the Measuring Instruments Directive (2004/22/EC) is a directive by the European Union, which intends to create a common market for measuring instruments across the 27 countries of the EU.

Meters which receive a certain class of MID certification may be used or sold in all countries across the EU for billing purposes.

9.2. Meter certification

MID started on the 31st of August 2006. It runs alongside Ofgem until 31 Oct 2016. After which Ofgem meters less than 100kW cannot be installed or replaced when used for billing.

MID is split into a number of classes:

- MID b – this is a “conforms to” mark and cannot be used for billing
- MID b + d – this means the unit is self-certified and can be used for billing
- MID f – this is an independently verified mark and can be used for billing

The MID f mark is rare, due to the costs per product – “MID certified” with MID b + d is most common.

The accuracy of the accruing of data at the meter is what is certified the output method is completely independent.

In a dispute over billing accuracy the Fair Trade office would refer straight to the certified meter counter itself and not the centralised control system. Therefore both pulse and Modbus outputs are found on meters allowing the user to choose their method of centralised monitoring.

Their advice is to have the ability to see any faults with centralised monitoring and to periodically verify with actual meter readings.

10.Frequently asked questions

1. How many Pulse meters can we connect to a single PAC-YG60MCA?
➔ 4.
2. Is there a limit on the number of PAC-YG60MCA per AE-C400E/EW-C50E?
➔ Yes, the limit is 15.
3. How many MNET addresses does the PAC-YG60MCA use?
➔ The PAC-YG60MCA uses only one MNET address even when 4 meters are connected.
4. Is it possible to setup tariffs on AE-C400E/EW-C50E?
➔ Yes
5. Is it possible to include indoor energy consumption to the energy bills?
➔ Yes, Indoor energy consumption can be estimated or measured using dedicated pulse energy meters.
6. How long does the AE-C400E or EW-C50E store the energy data for?
➔ The energy management data for the past 24 months (daily or monthly data) or the past 5 years (annual data) from the present can be retained.
7. Does the MelcoBEMS stores the energy monitoring data?
➔ No, the BEMS company must read the data daily or monthly and store it.